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A 14-PAGE SPECIAL REPORT ON THE FUTURE OF FINANCE



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Greed—and fear

Also in this section

Wild-animal spirits

Why is finance so unstable? Page 6

In Plato's cave

Mathematical models are a powerful way of predicting financial markets. But they are fallible. Page 10

When markets turn

A parable of how modern finance can go wrong. Page 12

How to play chicken and lose

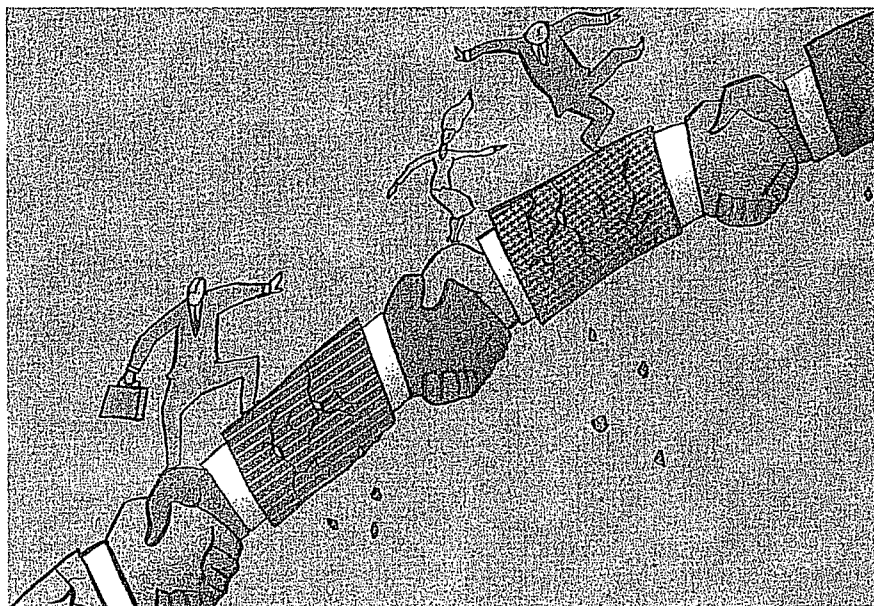
Finance suffers from reverse natural selection. Page 14

The uneven contest

Financial regulation is essential. That does not make it easy. Page 18

Fixing finance

The world now has a chance to make finance work better. It should tread carefully. Page 20



The golden age of finance collapsed under its own contradictions. Edward Carr asks why it went wrong and what to do next

THE monument to Soviet central planning was supposed to have been a heap of surplus left boots without any right ones to match them. The great bull market of the past quarter century is commemorated by millions of empty houses without anyone to buy them. Gosplan drafted workers into grim factories even if their talents would have been better suited elsewhere. Finance beguiled the bright and ambitious and put them to work in the trading rooms of Wall Street and the City of London. Much of their effort was wasted. You can only guess at what else they might have achieved.

When the financial system fails, everyone suffers. Over the past 22 months the shock has spread from American housing, sector by sector, economy by economy. Some markets have seized up; others are being pounded by volatility. Everywhere good businesses are going bankrupt and jobs are being destroyed. For the first time since 1991 global average income per head is falling. Even as growth in emerging markets has come to a halt, the rich economies look set to shrink. Alan Greenspan, who as chairman of America's Federal Reserve oversaw the boom, calls the collapse "a once-in-a-half-century, probably once-in-a-century type of event". Financial markets promised prosperity; instead they have brought hardship.

Financial services are in ruins. Perhaps half of all hedge funds will go out of busi-

ness. Without government aid, so would many banks. Britain has suffered its first bank-run since Disraeli was prime minister in the 1870s. America has stumbled from one rescue to the next. The Wall Street grandees have been humbled. Hundreds of thousands of people in financial services will lose their jobs; many millions of their clients have lost their savings.

For a quarter of a century finance basked in a golden age. Financial globalisation spread capital more widely, markets evolved, businesses were able to finance new ventures and ordinary people had unprecedented access to borrowing and foreign exchange. Modern finance improved countless lives.

But more recently something went awry. Through insurance and saving, financial services are supposed to offer shelter from life's reverses. Instead, financiers grew rich even as their industry put everyone's prosperity in danger. Financial services are supposed to bring together borrowers and savers. But as lending markets have retreated, borrowers have been stranded without credit and savers have seen their pensions and investments melt away. Financial markets are supposed to be a machine for amassing capital and determining who gets to use it and for what. How could they have been so wrong?

Finance is increasingly fragile. Barry Eichengreen of the University of California at Berkeley and Michael Bordo of Rutgers ▶▶

Acknowledgments

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A list of sources is at

www.economist.com/specialreports

An audio interview with the author is at

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► University identify 139 financial crises between 1973 and 1997 (of which 44 took place in high-income countries), compared with a total of only 38 between 1945 and 1971. Crises are twice as common as they were before 1914, the authors conclude.

The paradox is that financial markets can function again only if this lesson is partly forgotten. Financial transactions are a series of promises. You hand your money to a bank, which promises to pay it back when you ask; you invest in a company, which promises you a share of its future profits. Money itself is just a collective agreement that a piece of paper can always be exchanged for goods or services.

Imagine, for a second, how finance began, with small loans within families and between trusted friends. As the circle of lenders and borrowers grew, financial transactions were able to muster larger sums and to spread risk, even as promises became harder to enforce. Paul Seabright, an economist at the University of Toulouse in France, observes that trust in a modern economy has evolved to the miraculous point where people give complete strangers sums of money they would not dream of entrusting to their next-door neighbours. From that a further miracle follows, for trust is what raises the billions of dollars that fund modern industry.

Trust's slow accumulation pushes financial markets forward; its shattering betrayal batters them back. Sometimes this is through bad faith, as when Bernie Madoff, a grand fund manager, allegedly made his investors \$50 billion poorer, or mortgage-sellers tempted naive borrowers. But promises made in good faith can be broken too. Indeed, honest failure is even more corrosive of trust than outright criminality. Everyone understands that now.

New order

The failure of finance will affect ideology, too. Many people find capitalism's central planner hard to put up with at the best of times. Free markets shun seemingly worthy causes, whereas the frivolous or apparently undeserving are rewarded. Look at the financial-services industry itself. In America middle-class pay has stalled in recent years but financiers have figured prominently among the tiny number of people who have captured much of the extra income. For as long as the world economy was growing fast, financial markets commanded grudging allegiance. Yet the same financiers who preached the necessity of free markets on the way up have since depended on taxpayers to save their indus-

try at a cost of trillions of dollars.

Financiers will find the arguments for free markets harder to make now that they have lost the benefit of the doubt. Charles Kindleberger's classic study, "Manias, Panics and Crashes: A History of Financial Crises", updated by Robert Aliber in 2005, suggests that financial instability feeds on itself. Japanese savings fled their own bust and sloshed first into the Nordic countries and then into Asia, which suffered contagion in 1997.

Some see today's disaster as a result of that Asian crash. Asian nations—especially China—have been determined to be part of global capital markets but not to run current-account deficits which would leave them vulnerable to sudden currency outflows. So they have been happy to see their money go abroad. In the phrase of Martin Wolf, an economic columnist at the *Financial Times*, they "smoke but do not inhale".

In 2006 America's current-account deficit peaked at 6% of its GDP (see chart 1). Between 2000 and 2008 the country received over \$5.7 trillion from abroad to invest, equivalent to over 40% of its 2007 GDP. Over the same period Britain and Ireland absorbed around a fifth of their 2007 GDPs and Spain a vast 50%. The financial system had the job of recycling the money to borrowers. Inevitably, credit became cheaper and savings declined. In America savings fell from around 10% of disposable income in the 1970s to 1% after 2005.

Not everyone agrees about the cause of this torrent of foreign capital. Although some blame Asian saving, others point to Western extravagance. But there is little doubt about the consequences. All four of the debtor countries in the chart enjoyed housing booms. Jeffrey Frieden, a political economist at Harvard University, says about three-quarters of credit booms fi-

nanced from abroad end up in crashes.

And yet financial services were not so much a victim of the inflows of foreign capital as an eager accomplice. The question is why financial systems are so liable to turn foreign credit into ruinous busts. In particular, why did America, home to the world's most advanced financial system, turn foreign credit into the world's most serious post-war bust?

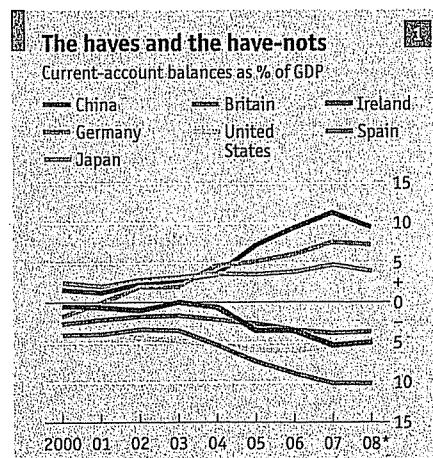
The suspicion is that American know-how and talent made the disaster worse. Of all the financial instruments to have failed, newfangled collateralised-debt obligations (CDOs) have turned out to be among the most devastating. One way of thinking about CDOs, says Raghuram Rajan, a professor at the University of Chicago, is as a mechanism for converting mortgage securities and corporate bonds from huge, illiquid assets owned by local investors into liquid financial instruments that could be flogged across the world. Philip Lane, of Trinity College Dublin, thinks that sophisticated American financial services combined dangerously with relatively unsophisticated financial services elsewhere.

Never again, etc

If the price of sophistication is instability, something is wrong. You might conclude that the thing to do is to shackle finance as it was shackled in the 1950s and 60s. If ever there were a moment for this, it would be now. It takes a big upheaval to open the way for radical reform. The structure of financial regulation in America still bears the mark of ideas forged in the Depression.

Reform is certainly needed, yet, for all the excesses and instability of finance, a complete clampdown would be a mistake. For one thing, remember the remarkable prosperity of the past 25 years. Finance deserves some of the credit for that. Note, too, that finance has always been plagued by crises, whether the system is open or closed, simple or sophisticated. Attempts to regulate finance to make it safe often lead to dangerous distortions as clever financiers work around the rules. If there were a simple way to prevent crises altogether, it would already be the foundation stone of financial regulation.

In fact, the aim should be neither to banish finance nor to punish it, but to create a system that supports economic growth through the best mix of state-imposed stability and private initiative. Modern finance is flawed, unstable and prone to excess. But think of those boots and those wasted lives: planned markets are flawed, unstable and excessive too. ■



Wild-animal spirits

Why is finance so unstable?

WHEN people look back on a bubble, they tend to blame the mess on crookery, greed and the collective insanity of others. What else but madness could explain all those overpriced Dutch tulips? With hindsight, today's mortgage disaster seems ridiculously simple. Wasn't it the fault of barely legal mortgage underwriting, overpaid investment bankers and the intoxication of easy credit? Yet there is an element of the madhouse in that explanation too. Cupidity, fraud and delusion were obviously part of the great bust. But if they are the chief causes of bubbles—which have repeatedly plagued Western finance since its origins in the Italian Renaissance—you have to suppose that civilisation is beset by naivety and manic depression.

In fact, observes Abhijit Banerjee, an economist at the Massachusetts Institute of Technology, a little irrationality goes a long way. When reasonable, self-interested people trade with each other, optimism tends to breed optimism—until it subsides into corrosive pessimism. In the words of Willem Buiter, of the London School of Economics, “finance is a scary, inherently unstable, essential activity.”

Financial services are different from other industries, if only because so much of the business is writing bets. One side pays the other for a claim that comes good if, say, oil prices fall, or a company defaults on its bonds, or householders make their mortgage payments on time. When people talk about losses in finance, they are often thinking about only one side of these contracts. In fact, for every loser on a credit-default swap, for example, there is a corresponding gainer. These are bets, remember: if the punters are down, the bookies are up by the same amount. In the jargon, the claims “net to zero”.

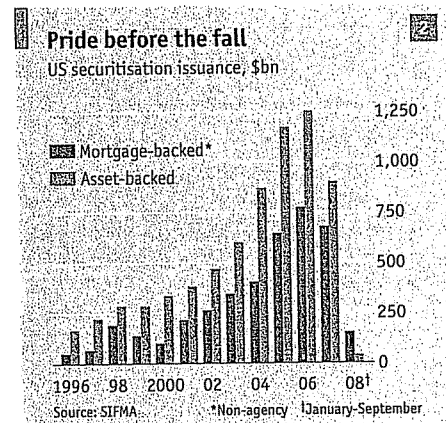
That sounds safe enough. Yet the winners and losers behave differently. The winners' extra spending may not offset the losers' retrenchment. And the losers may not be able to afford to pay out, either because they do not have the money—they are insolvent—or because they cannot easily raise the money—they are illiquid. This “counterparty risk”, which grows with the volume of bets, has been the outstanding feature of this crisis. American Interna-

tional Group (AIG), once the world's biggest insurer, was bailed out by the American government when it became clear that it would not be able to honour its vast one-way bets on financial stability. Had AIG failed, the banks on the other side would have been in trouble. Although the market netted to zero, it was poised for disaster.

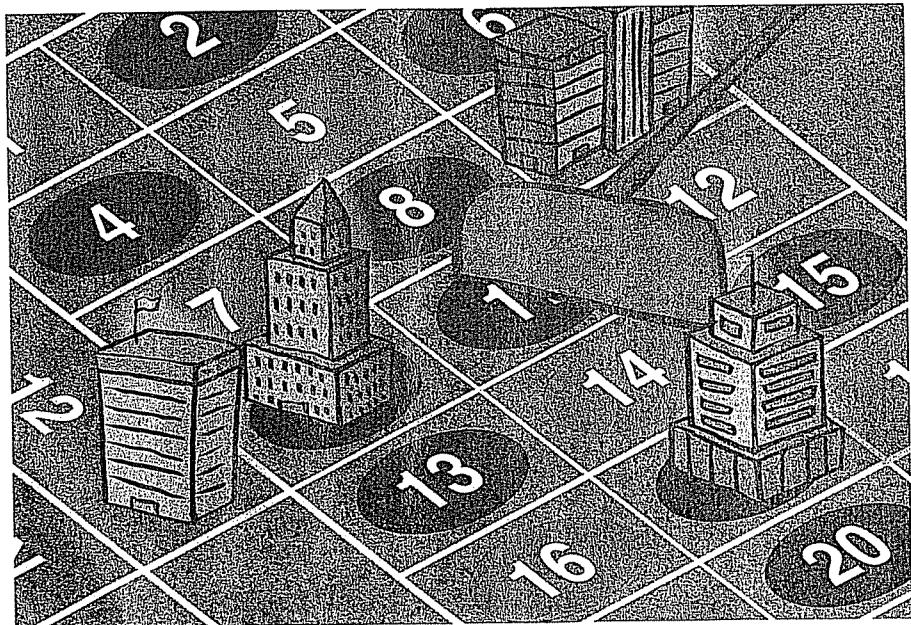
Infectious optimists

In a boom there is every chance that the betting will get out of hand. Expansion in most businesses is held in check by the need to build assembly lines, rent retail space or hire workers. All that takes time and money. By contrast, financial contracts can be written almost instantaneously and without limit.

Whenever issuers compete for market share or buyers pile in because they are afraid of missing the boat, a boom may be in the making. Investors herd together in this way because, as John Maynard Keynes argued, they do not have a sure grasp of the future. Faced with uncertainty, they resort to whatever conventions they can find to cling to, from popular wisdom to new theories. In a boom, overconfident investors take on bets that they later find themselves unable to discharge.



Conventions are one reason why the appetite to buy financial assets tends to feed on itself (see chart 2). In textbook markets for goods, price increases lead to a fall in demand and to substitution. By contrast, rising asset prices tend to be seen, within limits, as a cause to buy. People take rising share prices as a sign of confidence and a reason to put money into their retirement accounts or mutual funds. More recently, falling prices have been taken as a signal to flee, even though shares are much cheaper than they were not so long ago. ▶▶



▶ Asset prices pull themselves up by their own bootstraps. As houses become more valuable, house owners feel richer. If they then spend more, companies make more money, which in turn increases the value of shares and bonds. Profitable companies invest and create jobs. As the economy thrives, there are fewer defaults. Lenders are therefore willing to lend more on easier terms. This extra credit makes asset markets liquid: if ever you need to sell something, there always seems to be a ready buyer. Ample credit also tends to feed into spending and asset prices. That makes people feel richer. And so it goes on.

For as long as people are optimistic, the creation of credit is hard to restrain. Although banks are usually happy to join in, they do not have to be involved, at least for a while. In the boom in Kuwait between 1977 and 1982, people started to use post-dated cheques to pay for shares and property. According to Kindleberger, the value of these circulating 100s peaked at some \$100 billion, a far larger sum than was kept on deposit in the banks.

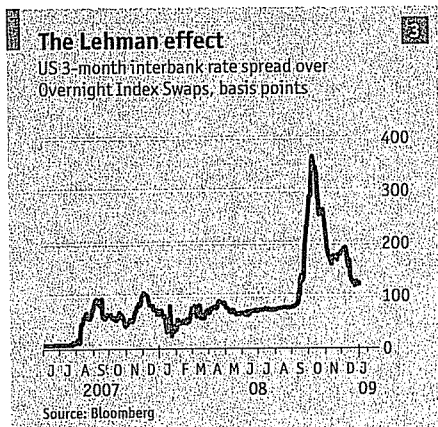
Similarly, when the economy does well, borrowers want to take on more debt. Not only are managers ambitious to expand, but shareholders tend to encourage them. That is partly because in a boom they think it is a low-risk way to increase the return on equity. It is also because the burden of larger interest payments leaves managers with less scope to fritter away cash on pet projects that may not benefit their shareholders.

Things that go pop

Manifestly, this virtuous circle does not operate unchecked. Potential bubbles often collapse early and harmlessly because fundamental forces are pulling in the other direction. Investors, torn between being late and being wrong, are restrained by rules of thumb, such as historical analogies and price-earnings ratios for shares. Their optimism is continually buffeted by scares and speculators who test whether a rising market is robust. The authorities carry out their original duty, to watch over the banking system, and they can use their newer powers by raising interest rates to damp down spending and borrowing.

However, bubbles sometimes get out of hand, and if they do, at some point they will stop inflating and start deflating. The cause can be small or large. A failed airline buy-out finished the debt-fuelled boom at the end of the 1980s; the entire housing market went wrong in 2007.

The more efficient the financial system,



the faster fear will spread. As asset prices fall, people spend less and investors fore-shadow lower profits and higher defaults by running from corporate bonds and shares. When investors lose confidence that other people will honour the promises that underpin financial assets, they retreat to government bonds, cash or gold, which are more dependable. Liquidity and credit suddenly become scarce and a devastating, value-destroying uncertainty takes hold. In 2007 Dick Fuld, the former head of Lehman Brothers, observed that whereas credit grows arithmetically, it shrinks geometrically. Much to his cost, he was later proved right.

Investors take all sorts of precautions to ensure that the people they deal with will honour their promises. They demand regulation and accurate accounts that price assets at market values; they want loans to be backed by collateral and covenants; they ask specialist agencies to rate borrowers' creditworthiness; and so on. Such safeguards, essential as they are in policing individual lenders, tend to feed greed in greedy times and fear in fearful ones.

Chart 3 shows how lenders to banks registered alarm after Lehman collapsed in September last year. So worried were they about the risk of being wiped out in a bankruptcy or a state rescue that they suddenly started to demand that banks hold much more capital against their assets. For decades this ratio had been stable, below 10% of book assets, though it was over 50% in the 1840s, when banks were apt to fail more often.

Nobody can be sure how much capital shareholders now want banks to hold, but Alan Greenspan, a consultant these days, thinks the figure could have grown to 15% of their assets. If so, the banks will have to raise money and sell loans and securities even as politicians are asking them to lend

more. Investors' desire for extra protection has made the contraction of credit worse.

The same thing happened with collateral. As the number of defaults falls in the boom, borrowers' credit ratings improve, assets are highly valued and lenders accept a broader range of them. In the bust many borrowers have had to find more collateral to offset falling asset prices. Some borrowers may have had to post cash or some other liquid asset. Precisely when markets have turned down, forced asset sales have weakened them further. Borrowing has become harder and more expensive.

In the booming American housing market mortgage originators were happy to accept no security at all, lending 100% of the value of the house—partly because they thought house prices would continue to rise, and partly because they assumed the market would be liquid enough for them to palm the mortgages off on other investors. As it happened, the mortgage originators were wrong and the loans that were stuck on their books helped destroy their businesses.

Just say no

Some would seek to limit the ebb and flow of confidence with early warnings, as if financial busts were a hurricane or an outbreak of plague. Gordon Brown, Britain's prime minister, would like to see the IMF cast in that role.

History suggests that such schemes do not work. People enjoy booms. Walter Bagehot, an editor of *The Economist* in the 19th century, observed that "all people are most credulous when they are most happy." Whatever Mr Brown says now, politicians like booms too. As chancellor of the exchequer, if the IMF dared criticise the British economy he used to be dismissive.

Seers like Henry Kaufman, a Wall Street veteran, and Nouriel Roubini, of the NYU Stern School of Business in Manhattan, pointed to the risks of a disaster, but were largely ignored. When Paul Warburg, a renowned banker, spoke about a possible Wall Street collapse in 1929, he was accused of "sandbagging American prosperity". J.K. Galbraith, who recounts the story in "A Short History of Financial Euphoria", detects a whiff of anti-Semitism in Warburg's treatment.

If it is hard to stop booms once they are in full swing, it is no easier to prevent them from starting in the first place. Hyman Minsky, an unconventional economist who made it his life's work to study crises, was convinced that they arose spontaneously. Financial stability itself creates con- ▶▶

► fidence and risk-taking, eventually leading to recklessness and instability. After the bust, stability will return and the cycle will begin again. Similarly, David Roche and Bob McKee, of Independent Strategy, an investment consultancy, among others, think credit started flowing more easily in the 1980s because the rich economies conquered inflation and the large emerging markets embraced globalisation.

Relax and enjoy it

Some booms started with liberalisation. Japan created a huge share and property bubble in the 1980s by relaxing its strict banking regulation. The banks fell over each other to lend money as they jostled for market share. Extra credit found its way into stock and property prices. Kindle-

berger identified a similar pattern in Latin America and again in Poland and in parts of the former Soviet Union. Liberalisation brings many advantages, but unless it is carefully managed it can lead to trouble.

Some booms started with technological innovation. Carlota Perez, a Venezuelan economist, thinks that each new industrial technology favours its own sort of financing. Local banks grew up to raise capital for the small companies created in Britain's industrial revolution; joint-stock companies thrived when businessmen needed to finance the railways in the 19th century; industrial banks backed new continental European industries; consumer finance helped Americans buy cars and fridges in the early 20th century. Ms Perez links each financial innovation to its own

booms and busts.

That seems deterministic. But the internet revolution really did spill over into the rest of business and finance. Paul Krugman, the most recent Nobel laureate for economics, puts it with characteristic acerbity: the huge, strait-laced, bureaucratic corporations that ruled the roost before the dotcoms were, he says, like "socialism without the justice". By contrast, internet business was full of optimism. And in finance, optimism is everything.

Powerful new computers also created a platform for a new sort of mathematical finance. In the hands of "quants"—the mathematicians and physicists expert in the arcane of quantitative analysis—this proved immensely versatile. Unfortunately, it also led financial services astray. ■

In Plato's cave

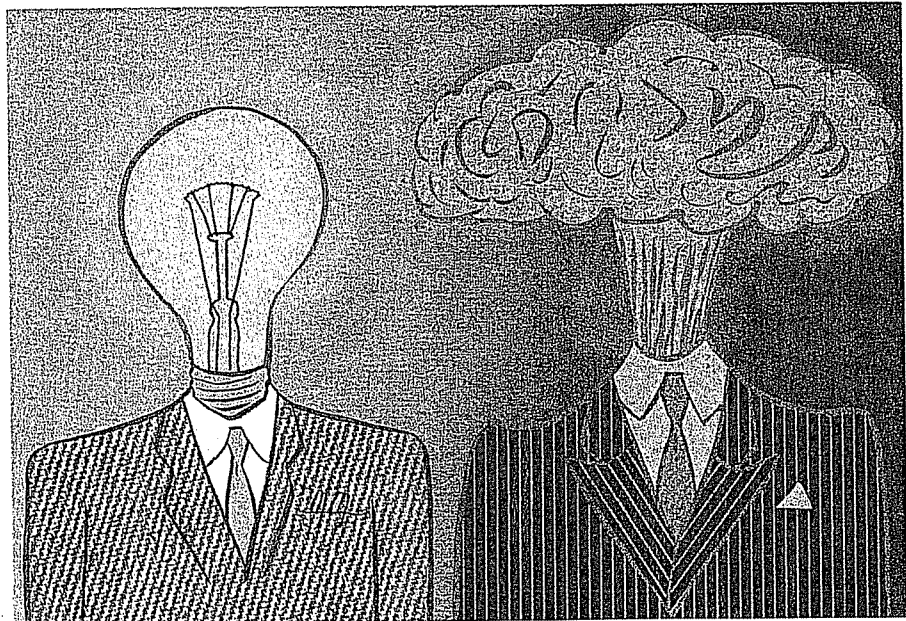
Mathematical models are a powerful way of predicting financial markets. But they are fallible

ROBERT RUBIN was Bill Clinton's treasury secretary. He has worked at the top of Goldman Sachs and Citigroup. But he made arguably the single most influential decision of his long career in 1983, when as head of risk arbitrage at Goldman he went to the MIT Sloan School of Management in Cambridge, Massachusetts, to hire an economist called Fischer Black.

A decade earlier Myron Scholes, Robert Merton and Black had explained how to use share prices to calculate the value of derivatives. The Black-Scholes options-pricing model was more than a piece of geeky mathematics. It was a manifesto, part of a revolution that put an end to the anti-intellectualism of American finance and transformed financial markets from bull rings into today's quantitative powerhouses. Yet, in a roundabout way, Black's approach also led to some of the late boom's most disastrous lapses.

Derivatives markets are not new, nor are they an exclusively Western phenomenon. Mr Merton has described how Osaka's Dojima rice market offered forward contracts in the 17th century and organised futures trading by the 18th century. However, the growth of derivatives in the 36 years since Black's formula was published has taken them from the periphery of financial services to the core.

In "The Partnership", a history of Goldman Sachs, Charles Ellis records how the



derivatives markets took off. The International Monetary Market opened in 1972; Congress allowed trade in commodity options in 1976; S&P 500 futures launched in 1982, and options on those futures a year later. The Chicago Board Options Exchange traded 911 contracts on April 26th 1973, its first day (and only one month before Black-Scholes appeared in print). In 2007 the CBOE's volume of contracts

reached almost 1 trillion.

Trading has exploded partly because derivatives are useful. After America came off the gold standard in 1971, businesses wanted a way of protecting themselves against the movements in exchange rates, just as they sought protection against swings in interest rates after Paul Volcker, Mr Greenspan's predecessor as chairman of the Fed, tackled inflation in the 1980s. ►

When markets turn

GEORGE SOROS, one of the original hedge-fund managers, believes that every boom in the making is tested. Often the potential bubble succumbs and is forgotten. If it survives, the market's misplaced faith is redoubled. That, Mr Soros says, is when things become dangerous.

The test for the credit boom was Long-Term Capital Management (LTCM), a super-brainy hedge fund created by John Meriwether and his team from Salomon Brothers, along with Robert Merton and Myron Scholes, the pair of Nobel laureates who had worked with Fischer Black on options pricing. The markets should have learnt from LTCM's collapse, but they were too busy making money.

LTCM's strategy was to scour world markets for pairs of assets with prices that appeared to be out of line with each other. For instance, at Salomon Mr Meriwether's team had spotted that the 29-year Treasury bond was surprisingly cheap compared with the 30-year Treasury bond. If you think about it, the 30-year is just months from becoming a 29-year Treasury. It was dearer because a lot of people wanted it in their portfolios, but did not think to buy the 29-year. So Mr Meriwether sold 30-year Treasuries and bought 29-year Treasuries and waited for the gap to close.

For a while LTCM was outstandingly successful. Over time, it found 38,000 of those mispriced pairs. In 1996 alone LTCM's investors made a profit of \$1.6 billion. By 1998 it had so much money that it returned more than a third of its \$7 billion in capital to its investors. But in August

1998 Russia defaulted on its debt, sending financial markets into a frenzy. LTCM began to lose money. According to Charles Ellis, the author of the Goldman book, in the second week of September its losses were as follows:

Thursday 10th: \$145m
Friday 11th: \$120m
Monday 14th: \$5m
Tuesday 15th: \$87m
Wednesday 16th: \$122m

LTCM's collapse was the credit crunch in miniature:

- The fund depended on debt. Its real return in that bumper year of 1996 was a modest 2.45%. It made so much money because only \$4 out of every \$100 was equity. Earning \$2.45 of profit on \$4 of equity is pretty good. Unfortunately, as LTCM discovered, equally small losses could wipe out the fund.
- It was secretive. LTCM traded each half of its pairs with separate brokers because it did not want anyone copying its strategy. That was an advantage when it was riding high. But when the tide turned, its brokers wanted more security, as they could not judge the risk of its pairings and its hedges.
- In a crisis everything correlates. LTCM's asset pairs should have been independent of each other. But when Russia defaulted, the whole market bolted for safety. LTCM had been buying the less liquid of each pair of assets and selling the more liquid. Suddenly all its positions were in trouble at once.
- LTCM failed to grasp how much it was affecting the market. Allegedly Goldman

price, the more confidently you can take on any level of risk. "In a thirsty world filled with hydrogen and oxygen," Mr Derman has written, "someone had finally worked out how to synthesise H₂O."

Poetry in Brownian motion

Black-Scholes is just a model, not a complete description of the world. Every model makes simplifications, but some of the simplifications in Black-Scholes looked as if they would matter. For instance, the maths it uses to describe how share prices move comes from the equations in physics that describe the diffusion of heat. The idea is that share prices follow some gentle random walk away from an equilibrium, rather like notes of dust jiggling around in Brownian motion. In fact, share-price movements are more violent than that.

A parable of how modern finance can go wrong

Sachs and others eventually began to copy LTCM. When it got into trouble and had to start unwinding its bets, others sold first. Its own positions were so big that its selling put further pressure on prices. Whereas the prices of asset pairs should have converged, they were forced further apart, making LTCM's losses even bigger.

After Wall Street bailed LTCM out, Mr Meriwether quoted his colleague, Victor Haghani, on how other firms had traded against it: "The hurricane is not more or less likely to hit because more hurricane insurance has been written. In the financial markets this is not true. The more people write financial insurance, the more likely it is that a disaster will happen, because the people who know you have sold the insurance can make it happen."

It was an example of something that Mr Soros calls "reflexivity". Once people come to believe that house prices never fall, they will buy too much property—and house prices will fall. When they believe that shares always do well in the long run, they will buy too many shares—and the market will do badly for years. When funds believe that diversification always pays, they all invest in the same exotic instruments. Diverse markets suddenly have something in common: the funds that have bought into them.

People often talk about financial markets as if they were casinos, but reflexivity makes them much more dangerous than any gambling den. The numbers on a roulette wheel never change, but markets offer no guarantee that yesterday's odds will be the same tomorrow.

▶ Equity options enabled investors to lay off general risk so that they could concentrate on the specific types of corporate risk they wanted to trade.

The other force behind the explosion in derivatives trading was the combination of mathematics and computing. Before Black-Scholes, option prices had been little more than educated guesses. The new model showed how to work out an option price from the known price-behaviour of a share and a bond. It is as if you had a formula for working out the price of a fruit salad from the prices of the apples and oranges that went into it, explains Emanuel Derman, a physicist who later took Black's job at Goldman. Confidence in pricing gave buyers and sellers the courage to pile into derivatives. The better that real prices correlate with the unknown option

Over the years the "quants" have found ways to cope with this—better ways to deal with, as it were, quirks in the prices of fruit and fruit salad. For a start, you can concentrate on the short-run volatility of prices, which in some ways tends to behave more like the Brownian motion that Black imagined. The quants can introduce sudden jumps or tweak their models to match actual share-price movements more closely. Mr Derman, who is now a professor at New York's Columbia University and a partner at Prisma Capital Partners, a fund of hedge funds, did some of his best-known work modelling what is called the "volatility smile"—an anomaly in options markets that first appeared after the 1987 stockmarket crash when investors would pay extra for protection against another imminent fall in share prices. ▶▶

► The fixes can make models complex and unwieldy, confusing traders or deterring them from taking up new ideas. There is a constant danger that behaviour in the market changes, as it did after the 1987 crash, or that liquidity suddenly dries up, as it has done in this crisis. But the quants are usually pragmatic enough to cope. They are not seeking truth or elegance, just a way of capturing the behaviour of a market and of linking an unobservable or illiquid price to prices in traded markets. The limit to the quants' tinkering has been not mathematics but the speed, power and cost of computers. Nobody has any use for a model which takes so long to compute that the markets leave it behind.

The idea behind quantitative finance is to manage risk. You make money by taking known risks and hedging the rest. And in this crash foreign-exchange, interest-rate and equity derivatives models have so far behaved roughly as they should.

A muddle of mortgages

Yet the idea behind modelling got garbled when pools of mortgages were bundled up into collateralised-debt obligations (CDOs). The principle is simple enough. Imagine a waterfall of mortgage payments: the AAA investors at the top catch their share, the next in line take their share from what remains, and so on. At the bottom are the "equity investors" who get nothing if people default on their mortgage payments and the money runs out.

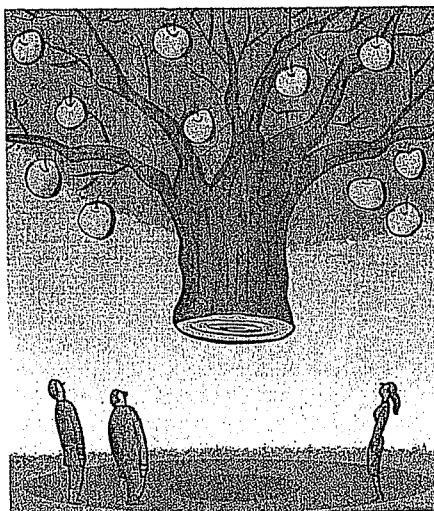
Despite the theory, CDOs were hopeless, at least with hindsight (doesn't that phrase come easily?). The cash flowing from mortgage payments into a single CDO had to filter up through several layers. Assets were bundled into a pool, securitised, stuffed into a CDO, bits of that plugged into the next CDO and so on and on. Each source of a CDO had interminable pages of its own documentation and conditions, and a typical CDO might receive income from several hundred sources. It was a lawyer's paradise.

This baffling complexity could hardly be more different from an equity or an interest rate. It made CDOs impossible to model in anything but the most rudimentary way—all the more so because each one contained a unique combination of underlying assets. Each CDO would be sold on the basis of its own scenario, using central assumptions about the future of interest rates and defaults to "demonstrate" the payouts over, say, the next 30 years. This central scenario would then be "stress-tested" to show that the CDO was

robust—though oddly the tests did not include a 20% fall in house prices.

This was modelling at its most feeble. Derivatives model an unknown price from today's known market prices. By contrast, modelling from history is dangerous. There was no guarantee that the future would be like the past, if only because the American housing market had never before been buoyed up by a frenzy of CDOs. In any case, there are not enough past housing data to form a rich statistical picture of the market—especially if you decide not to include the 1930s nationwide fall in house prices in your sample.

Neither could the models take account of falling mortgage-underwriting stan-



dards. Mr Rajan of the University of Chicago says academic research suggests mortgage originators, keen to automate their procedures, stopped giving potential borrowers lengthy interviews because they could not easily quantify the firmness of someone's handshake or the fixity of their gaze. Such things turned out to be better predictors of default than credit scores or loan-to-value ratios, but the investors at the end of a long chain of securities could not monitor lending decisions.

The issuers of CDOs asked rating agencies to assess their quality. Although the agencies insist that they did a thorough job, a senior quant at a large bank says that the agencies' models were even less sophisticated than the issuers'. For instance, a BBB tranche in a CDO might pay out in full if the defaults remained below 6%, and not at all once they went above 6.5%. That is an all-or-nothing sort of return, quite different from a BBB corporate bond, say. And yet, because both shared the same BBB rating,

they would be modelled in the same way.

Issuers like to have an edge over the rating agencies. By paying one for rating the CDOs, some may have laid themselves open to a conflict of interest. With help from companies like Codefarm, an outfit from Brighton in Britain that knew the agencies' models for corporate CDOs, issuers could build securities with any risk profile they chose, including those made up from lower-quality ingredients that would nevertheless win AAA ratings. Codefarm has recently applied for administration.

There is a saying on Wall Street that the test of a product is whether clients will buy it. Would they have bought into CDOs had it not been for the dazzling performance of the quants in foreign-exchange, interest-rate and equity derivatives? There is every sign that the issuing banks believed their own sales patter. The banks so liked CDOs that they held on to a lot of their own issues, even when the idea behind the business had been to sell them on. They also lent buyers much of the money to bid for CDOs, certain that the securities were a sound investment. With CDOs in deep trouble, the lenders are now suffering.

Modern finance is supposed to be all about measuring risks, yet corporate and mortgage-backed CDOs were a leap in the dark. According to Mr Derman, with Black-Scholes "you know what you are assuming when you use the model, and you know exactly what has been swept out of view, and hence you can think clearly about what you may have overlooked." By contrast, with CDOs "you don't quite know what you are ignoring, so you don't know how to adjust for its inadequacies."

Now that the world has moved far beyond any of the scenarios that the CDO issuers modelled, investors' quantitative grasp of the payouts has fizzled into blank uncertainty. That makes it hard to put any value on them, driving away possible buyers. The trillion-dollar bet on mortgages has gone disastrously wrong. The hope is that the trillion-dollar bet on companies does not end up that way too.

Almost as damaging is the hash that banks have made of "value-at-risk" (VAR) calculations, a measure of the potential losses of a portfolio. This is supposed to show whether banks and other financial outfits are being safely run. Regulators use VAR calculations to work out how much capital banks need to put aside for a rainy day. But the calculations are flawed.

The mistake was to turn a blind eye to what is known as "tail risk". Think of the banks' range of possible daily losses and ►►

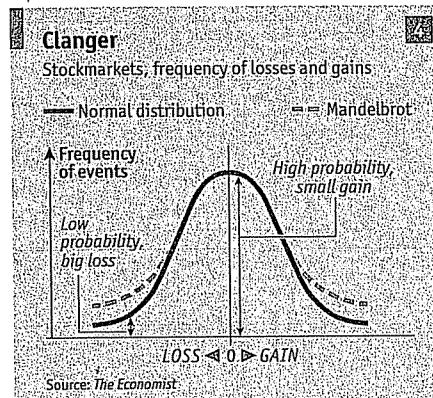
gains as a distribution. Most of the time you gain a little or lose a little. Occasionally you gain or lose a lot. Very rarely you win or lose a fortune. If you plot these daily movements on a graph, you get the familiar bell-shaped curve of a normal distribution (see chart 4). Typically, a VAR calculation cuts the line at, say, 98% or 99%, and takes that as its measure of extreme losses.

Tail spin

However, although the normal distribution closely matches the real world in the middle of the curve, where most of the gains or losses lie, it does not work well at the extreme edges, or "tails". In markets extreme events are surprisingly common—their tails are "fat". Benoît Mandelbrot, the mathematician who invented fractal theory, calculated that if the Dow Jones Industrial Average followed a normal distribution, it should have moved by more than 3.4% on 58 days between 1916 and 2003; in fact it did so 1,001 times. It should have moved by more than 4.5% on six days; it did so on 366. It should have moved by more than 7% only once in every 300,000 years; in the 20th century it did so 48 times.

In Mr Mandelbrot's terms the market should have been "mildly" unstable. Instead it was "wildly" unstable. Financial markets are plagued not by "black swans"—seemingly inconceivable events that come up very occasionally—but by vicious snow-white swans that come along a lot more often than expected.

This puts VAR in a quandary. On the one hand, you cannot observe the tails of the VAR curve by studying extreme events,



because extreme events are rare by definition. On the other you cannot deduce very much about the frequency of rare extreme events from the shape of the curve in the middle. Mathematically, the two are almost decoupled.

The drawback of failing to measure the tail beyond 99% is that it could leave out some reasonably common but devastating losses. VAR, in other words, is good at predicting small day-to-day losses in the heart of the distribution, but hopeless at predicting severe losses that are much rarer—arguably those that should worry you most.

When David Viniar, chief financial officer of Goldman Sachs, told the *Financial Times* in 2007 that the bank had seen "25-standard-deviation moves several days in a row", he was saying that the markets were at the extreme tail of their distribution. The centre of their models did not begin to predict that the tails would move so violently. He meant to show how unstable

the markets were. But he also showed how wrong the models were.

Modern finance may well be making the tails fatter, says Daron Acemoglu, an economist at MIT. When you trade away all sorts of specific risk, in foreign exchange, interest rates and so forth, you make your portfolio seem safer. But you are in fact swapping everyday risk for the exceptional risk that the worst will happen and your insurer will fail—as AIG did. Even as the predictable centre of the distribution appears less risky, the unobserved tail risk has grown. Your traders and managers will look as if they are earning good returns on lower risk when part of the true risk is hidden. They will want to be paid for their skill when in fact their risk-weighted returns may have fallen.

Edmund Phelps, who won the Nobel prize for economics in 2006, is highly critical of today's financial services. "Risk-assessment and risk-management models were never well founded," he says. "There was a mystique to the idea that market participants knew the price to put on this or that risk. But it is impossible to imagine that such a complex system could be understood in such detail and with such amazing correctness...the requirements for information...have gone beyond our abilities to gather it."

Every trading strategy draws upon a model, even if it is not expressed in mathematical symbols. But Mr Phelps believes that mathematics can take you only so far. There is a big role for judgment and intuition, things that managers are supposed to provide. Why have they failed? ■

How to play chicken and lose

Finance suffers from reverse natural selection

THE great American economist Irving Fisher was never able to live down his remark, just before the 1929 crash, that share prices had reached what seemed "a permanently high plateau". Fisher's shoes have been filled by Chuck Prince. "As long as the music is playing," the then head of Citigroup told the *Financial Times* just weeks before the credit markets seized up in August 2007, "you've got to get up and dance." Then he uttered his fatal coda: "We're still dancing."

It was a silly thing to say. Before the year was out Mr Prince had resigned over Citi's

losses. But it was not a silly thing to believe. In financial services, wallflowers are losers. A bank of Citi's size cannot sit out the boom without confronting commentators and investors alike. The winner is more likely to be the bank that dances in the hope that it can scramble to a seat when the music stops (even if, as in this crisis, there are virtually no seats).

Financial services will always be a tug-of-war between two contradictory promises: "Your money is safe with us" and "We will earn you higher returns." The disturbing truth behind Mr Prince's words is that

bit by bit a boom kills off those who tend towards safety. The survivors, meanwhile, go for returns, because as long as the sky is clear financial-services companies grow by earning money.

Since the 1970s Wall Street's tug-of-war has grown fiercer. The industry in America—and hence in the City of London, Frankfurt and Paris—has evolved from a guild of small partnerships trading in semi-rigged markets into a joust of giant multinationals and clashing egos. Competition has led to innovation and lower charges. It has increased the supply of cred- ▶



it, which boosts economic growth. But the job of managing financial-services powerhouses—keeping people's money safe as well as making a good return—has become harder than ever.

The good old days

In 1970 Goldman Sachs had about 1,300 people. At the end of last year it had roughly 30,000. In 1971 Morgan Stanley had about 3,500 people; at the peak, in 2006, it had 55,000. Although boutiques such as Perella Weinberg have sprung up in the intervening period, the story of commercial and investment banking has been broadly one of consolidation.

Roy Smith, a finance professor at NYU Stern School of Business in Manhattan, has counted no fewer than 28 takeovers of once-important commercial and investment banks since 1977. Kuhn Loeb, White Weld and Donaldson, Lufkin & Jenrette have all disappeared, as have Solomon Brothers, First Boston and Kidder Peabody. Firms also built up their capacity to trade in the secondary market, at first so they could make markets and later to earn profits on their own account. As the demand for capital grew, the partnerships were tempted to list their shares. The old Wall Street was lost.

It would be a mistake to idealise the partnerships. Samuel Hayes, of Harvard Business School, points out that after the second world war the fees for many operations were fixed. Underwriting syndicates for raising capital were predetermined for each client. If a minor but

ambitious firm like Salomon Brothers tried to by-pass the managing underwriter and go direct to a client, the underwriter would ostracise it and give it a bad name on Wall Street. Managed competition gave the firms an incentive to regulate themselves. Future profits depended on the status quo, which had to be protected. That produced stability, but at what cost to clients?

On the other hand, partnerships really were easier to run, because the firms were small and their business was straightforward. To the critics of modern-day investment banking, their virtue lay in the fact that their senior managers were also their owners. They were not gambling with shareholders' money.

The argument is that managers in recent times took excessive risks because they did not own their firms. Moreover, their pay gave them huge incentives to gamble with the business. In "Liar's Poker", his tale of Salomon Brothers in the 1980s, Michael Lewis records the words of a senior trader who worked for Lew Ranieri, the creator of mortgage-backed securities: "At other places management says, 'Well, gee, fellas, do we really want to bet the ranch on this deal?' Lewie was not only willing to bet the ranch, he was willing to hire people and let them bet the ranch too. His attitude was: 'Sure, what the fuck, it's only a ranch'."

In fact, the argument about ownership and pay is not entirely convincing. It is true that pay was large—far too large, it is clear, now that so many of the profits bankers earned in the bountiful years have turned

out to be illusory. But a bubble that inflated revenues, share prices, fees, profits and employment was bound to inflate pay too. By the same logic, today's bust will lower it.

The incentives were more complex than to bill shareholders by betting the ranch every time. Managers at Bear Stearns and Lehman Brothers were not partners, but they still owned large slugs of the business. Jimmy Cayne, Bear's chief executive, personally lost more than \$1 billion in its collapse; Dick Fuld, his counterpart at Lehman, is believed to have lost a similar amount. Although traders are overwhelmingly paid in cash, the managers who are supposed to oversee them take about half their bonuses in share options and shares that they are not allowed to sell for three to four years. Many outfits frowned on employees selling shares even when they were formally allowed to do so. After only a few years at a bank, most managers would have a large part of their wealth tied up in the firm's survival.

The end of partnerships turned private rivalries into a public tournament. The senior managers' wealth, careers and status were completely wrapped up in their firms' pre-eminence. League tables, quarterly results, daily share-price movements, total shareholder returns, all are ways of keeping score of who is up and who is down. If you did not compete, you were a dullard. If you pulled back, your career might be cut short. Not for nothing did they call the conservative Brown Brothers Harriman, the grandest remaining partnership, "the cemetery with the lights on". ▶▶

The uneven contest

Financial regulation is essential. That does not make it easy

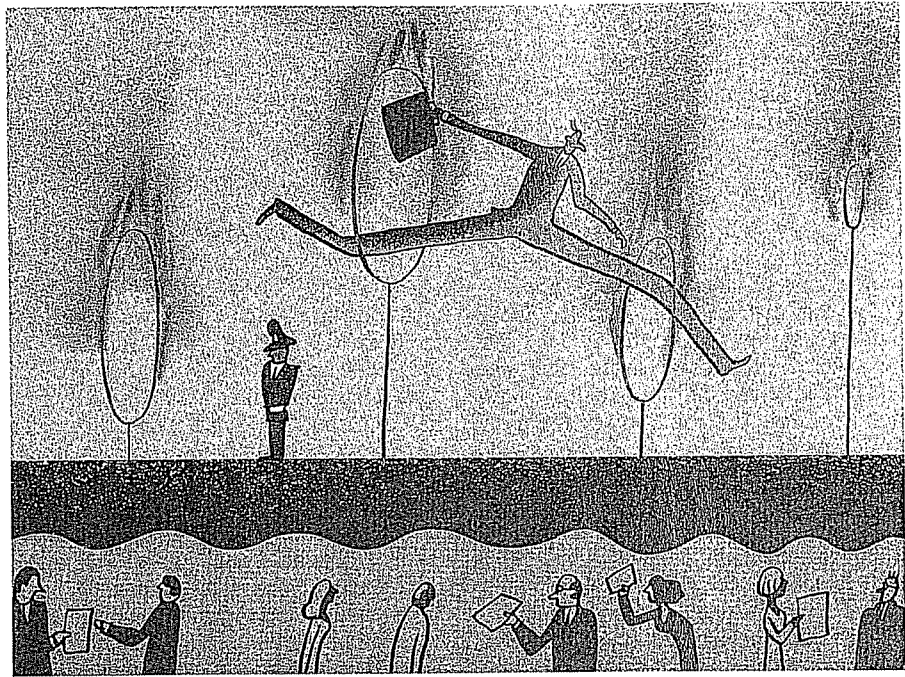
FINANCE is the machine that governs the economy, but it is unstable and dangerous. The managers of banks and other financial outfits cannot be trusted to counter the euphoria of investors, yet governments feel compelled to throw money at a bust. The case for regulation, in a nutshell, is that financiers make mistakes and everyone else has to pay for them.

Regulators start with some obvious advantages: the resources of the state, the backing of the law, access to confidential information and, for the time being at any rate, a supersized helping of moral authority. The last of those is temporarily convertible into budgets and reform. If regulators feel they need new powers, there could be no better time to secure them.

Yet the crisis has also shown that regulators are condemned to labour under many disadvantages. Some of these can be put right, but many are beyond the reach of any reform. Given the financial system's fallibility, regulation is bound to be fallible too. This is an important point. Expecting perfection of regulators undermines their authority when they fall short.

The most sensational regulatory failure of modern times is the alleged scam by Bernie Madoff. The Securities and Exchange Commission failed the investors he supposedly swindled over many years. Some of those investors were private citizens who depended upon the SEC. But others were professionals who charged their clients large fees to tell them where to put their money. Those professionals, too, failed to rattle Mr Madoff.

The world always seems to ascribe financial success to superior intelligence. Were the fund managers seduced by Mr Madoff's reputation and his list of investors? Were they impressed by his apparently safe, dependable returns? Were they fearful of looking stupid by questioning his strategy or, worse, his probity? A regulator like the SEC should not have been swayed by such things, especially if it had been warned by one of Mr Madoff's rivals, but the agency is staffed by people who are worse-paid and almost certainly worse-qualified than the elite professionals who were swayed too. As Ronald Cass, a former dean of Boston University School of Law,



has argued in the *Wall Street Journal*, Mr Madoff looks as if he broke plenty of laws that are already in force. His ability to mislead everyone around him "illustrates the limits of law, not the need for more of it".

Regulators are not the impartial, omniscient judges that legislation so often presumes. How could they be? In banks even senior managers have often lacked the timely and detailed information they needed to rein in their own traders. Regulators would struggle to do any better. They live in the financial markets. Many of them come to see the world in the same terms as their charges do. Rather than cast doubt on their own judgment by announcing that a long-held practice has ended in humiliation, regulators are tempted to hang on just a little bit longer.

Who dares, wins

In a fight, the regulators have the legal power. But the financiers have the political power, at least when there is no financial crisis in progress. The industry stands to make or lose large sums if the rules are changed, whereas everyone else has got better things to worry about than financial

regulation. The wealthy and well-connected people on Wall Street, fine citizens and generous donors, usually get their way.

It helps that the intellectual fashion has been for deregulation and free markets. Politicians such as Phil Gramm, formerly a senator from Texas, sponsored the repeal of the Glass-Steagall act, a Depression-era separation of investment and retail banking. That move has since come under attack as the sort of "market fundamentalist" project that caused the bubble. However, the supporters of the repeal argue that it was really a first step towards modernising a system which had outgrown Glass-Steagall. The original act described the world in categories that no longer fitted the industry it was supposed to regulate. The problem was not so much deregulation but regulation's failure to evolve with the so-called "shadow banking system".

This is a nexus of private-equity and hedge funds, money-market funds and auction-rate securities, non-banks such as GE Capital and new securities such as CDOs and credit-default swaps. It was erected over decades, partly on useful innovations and the desire for higher returns ▶▶

► and partly as a way to avoid the cost of regulation. On the eve of the crash, more capital was flowing through it than through the conventional banks. Now that it has imploded, the banks cannot fill the hole.

To see the system at work, look at auction-rate securities, a sort of long-term debt invented in the 1980s. The innovation was to set the interest rate in an auction, typically every seven, 28 or 35 days, giving lenders the chance to sell out each time. In theory, this offered the best of both worlds. Borrowers got long-term debt at near short-term interest rates. Lenders got almost instant access to their cash at a higher yield. At its peak the market was worth some \$330 billion.

Paul Krugman has pointed out that when you strip this trick down you are left with a bank loan. On one side are depositors, who expect to get their cash back pretty much whenever they want. On the other are long-term borrowers. Hundreds of years of banking history attest to the instability of this "maturity transformation". Sure enough, in February 2008 the auctions began to fail when there was a dash for cash. Suddenly lenders found that nobody wanted to buy their loans, so they could not get hold of their money. If the market for auction-rate securities had been a bank, you would have said that it had suffered a run. Yet auction-rate securities were not regulated like banks.

Time after time the market seems to have found ways to work around regulation. Banks paid insurers such as AIG to take on the risk that their assets would default, which saved them having to put capital aside as the regulations required. This neatly converted lower-rated securities into AAA ones—except that AIG almost went bust. The banks and insurers who sold money-market funds had promised their investors that, as with bank deposits, they would at least get their money back. When one fund broke that promise after Lehman Brothers collapsed, the run on money funds threatened to do so much damage to the credit markets that the Fed felt compelled to step in.

Too many knee-jerks

If something needs rescuing, it is a sign that it needs regulating. By that test, an awful lot needs to be rethought after this past year. The rescues of banks, insurers and mortgage lenders have also left some cleaning up to do. It seems harsh to criticise decisions improvised under pressure over a series of autumn weekends, but the authorities were inconsistent. The rescue of Bear Stearns wiped out the common shareholders. The rescue of Fannie Mae and Freddie Mac junked both the common shares and the preferred shares (which rank above them in a bankruptcy). With Lehman Brothers, everyone lost their

money. When AIG was saved, only the common shareholders suffered. But the bail-out of Washington Mutual hit both shareholders and senior-debt holders.

Any rescue is a balance. The immediate aim, to support the system, suggests an indiscriminate bail-out. Even punishing shareholders is counterproductive, because that makes raising capital harder just when capital is what the financial system needs most. On the other hand, capitalism requires the possibility of failure. Investors must pay for their mistakes.

The authorities' inconsistency left everyone guessing about whom they would rescue and how. It spread uncertainty among potential lenders and hope among petitioners. If you had been about to buy senior bank debt, it meant that you would think twice. If, like the car industry, you wanted a soft loan, you were encouraged to press your case.

After the rescues, the state is now the biggest owner of bank shares in many economies. Some governments may be tempted to direct their banks' lending, especially if the credit markets are not working. And forced mergers and rescues have created some banks that are unambiguously too big to fail. The market will break some of these apart, as at Citigroup. But regulators need to re-establish the idea that intervention is based on rules. The best way to do that is through re-regulation. ■

Fixing finance

The world now has a chance to make finance work better. It should tread carefully

THE world is only beginning to count the cost of the bust. In America the share of household and consumer debt alone went up from 100% of GDP in 1980 to 173% today, equivalent to around \$6 trillion of extra borrowing, according to Martin Barnes of BCA Research, a Canadian investment-research firm. Chart 6 on the next page, from Merrill Lynch, shows the growing burden on households. Some of this extra debt was the healthy outcome of a deepening financial system. It was bearable while households appeared to be getting richer, thanks to inflating house and share prices. But now it has become too much of a burden.

At the same time the financial-services industry is condemned to suffer a horrible contraction. In America the industry's

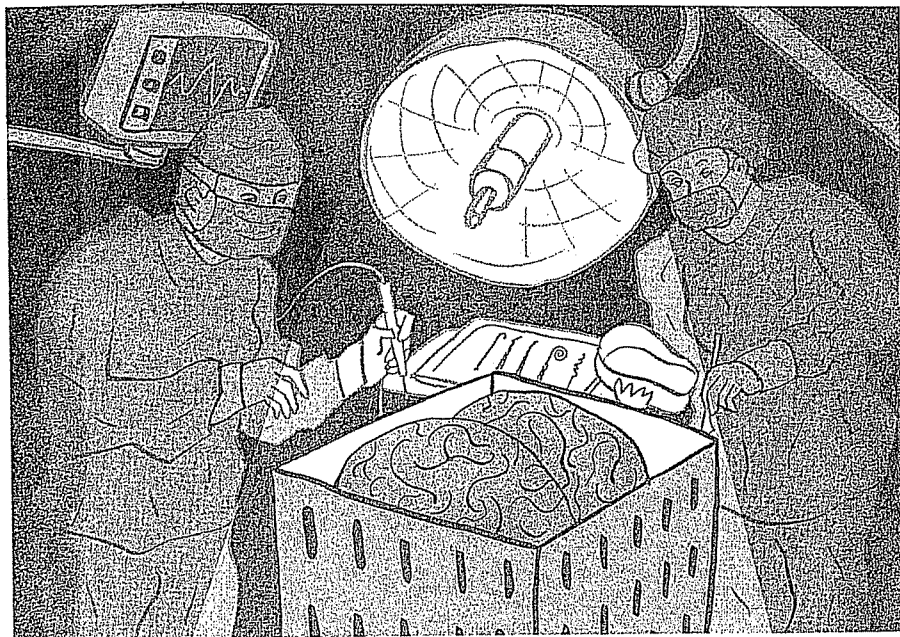
share of total corporate profits climbed from 10% in the early 1980s to 40% at its peak in 2007. Its share of the stockmarket's value grew from 6% to 23%, according to Mr Barnes. It is hard to believe that financial services create enough value to command such pre-eminence in the economy. At the peak, the industry accounted for only 14% of America's GDP and a mere 5% of private-sector jobs.

Financial markets are still in distress. Although some assets, such as good-quality corporate debt, seem cheap, nobody is buying them. Perhaps that is because valuations are so confusing, with assets priced far outside their familiar range; or perhaps it is because people expect prices to fall further. Meanwhile, rescues are the priority as the authorities rightly guard against one

collapse triggering others, as seemed possible after Lehman went down. The banks will need even more government money.

The underlying malaise is a retreat from debt. The "deleveraging", as household savings grow and the financial-services industry sheds debt, will mean that people spend less. Their prudent saving will destroy companies and jobs—Keynes's "paradox of thrift". Nobody can say where the new floor for debt will lie, just that finding it will be painful.

André Sapir, of the Université Libre de Bruxelles, recently told a *Financial Times* conference that government policy should not be aiming to avoid a repeat of 1929: it has already failed to do that. Instead it should aim to avoid 1930-32. Taxpayers will end up carrying the load. In effect, the ►►



▶ state will take on much of the debt that the private sector has decided to jettison. Some people will complain about that, but it makes sense to borrow to bring government spending forward. Just now, such public spending will hardly be crowding out the private sector: businesses find it impossible to borrow anyhow.

Higher government spending may save the world economy from a depression, but it cannot prevent a long hangover. The meltdown of 2008 is likely to cause a freeze during which credit refuses to grow. This could look like the aftermath of the Depression, when credit and trading in financial markets barely increased. James Grant, a financial commentator, has called those years the “inconsolable era” of American finance.

During that time the task will be to re-regulate finance. This will demand a large amount of spadework as well as one strategic choice. The spadework should aim to put right the failings of today’s regulation, which often owes more to politics than it does to sound finance. In America, for instance, the insurance industry is regulated

by the states; AIG’s capital-markets group, which lost all that money insuring CDOs for foreign banks, fell between stools. Similarly, futures come under one regulator, jealously guarded by its own congressional committees, and stocks under another. The status quo suits many interests, but the plan to reorganise America’s regulators put forward by Hank Paulson, the recently departed treasury secretary, deserves a good hearing.

Everywhere, countries need to look at their mortgage markets. As housing recovers, they should phase out tax relief on mortgage payments. America should give mortgage lenders a claim on more than just the borrower’s house, so as to deter speculative buying. At the same time, mortgage origination should be tightened up: too often lenders connived with borrowers to swell the size of mortgages, or worse, sell borrowers the wrong policy. Stopping housing from being a subsidised asset may not prevent booms or mis-selling—after all, unsubsidised Britain saw one of the bigger booms—but it should moderate them.

The presumption should be for transparency. That favours market-based accounting (which, for all its faults, is better than sweeping losses under the carpet). Securities such as credit-default swaps which trade in huge volumes should pass through clearing houses. That would have the added benefit of limiting the damage from a collapse, since the default would pass to the clearing house too. The system can be made more robust in other ways. Rather than regulate institution by institution, as at present, the authorities need to watch the overall level of credit creation and leverage. In this spirit, regulators can push against a boom by asking banks to hold more capital (though the markets will be pushing in the other direction). Senior

financiers could take more of their pay in equity—and hand some back if the bank does badly.

To mitigate future crises, the system needs to cope with capital flows by introducing reforms in emerging markets. And the rich world should aim to get the politics of regulation right for the long haul. The next 18 months to two years will offer a rare chance to do that. The rules need to be able to evolve along with the financial services themselves. That means regulating by function rather than by institution: if something looks like a bank, it should be treated like one. If a hedge fund or any other type of fund looks large enough to threaten the system, it will need watching.

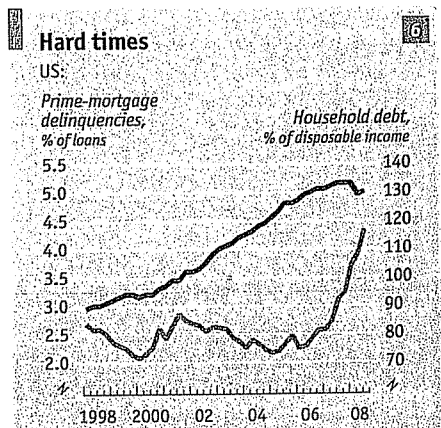
Andrew Lo, of the MIT Sloan School of Management, wants a government board to study “near misses” like Long-Term Capital Management. And national regulators could take strength from their international counterparts. A single supranational regulator is out of the question—indeed it may not even be wise to have one, as limited competition between regulators is useful. But international standards can guide domestic regulators.

Behind this spadework lies a strategic choice. The cheerleaders of finance were unwilling to admit that houses were too expensive and risk too cheap. On the other hand the critics of finance have been too swift to blame everything on their pet hates—deregulation, market fundamentalism, globalisation, whatever.

Pick your crisis

Centuries of boom and bust show that you cannot avoid financial crises altogether, but you can exercise some choice over what kind of crisis you get. Charles Wyplosz, professor of economics at the Graduate Institute in Geneva, envisages a spectrum, with an innovative, lightly regulated but crisis-prone financial system at one extreme and a stable, heavily regulated but stodgy one at the other. Depression-era America tried to tame finance’s most dangerous traits by moving towards safety. Gradually, modern finance has reversed that shift, creeping towards innovation and light regulation. There will now be strong calls to restore some of the old values. Is that the best balance to strike?

The answer depends on what you think you gain from innovation and lose from crises. Is it better to be a hare, scampering in fits and starts, or a tortoise, pressing relentlessly forward? For many people in financial services the choice is obvious. They would like to be free to innovate and ▶▶



► make money. In fact, the choice hinges on the interests of the economy as a whole. After all, it is taxpayers and savers who pay for financial crises.

Some people question whether financial innovation is worth very much these days. Willem Buiter, of the London School of Economics, thinks a stripped-down sort of finance could do most of what a modern economy needs. In a remarkable lecture given in 1984, near the beginning of the boom, James Tobin, a Nobel laureate (and Mr Buiter's former teacher), puts the case. His conclusion is worth quoting:

I [suspect] we are throwing more and more of our resources, including the cream of our youth, into financial activities remote from the production of goods and services, into activities that generate high private rewards disproportionate to their social productivity. I suspect that the immense power of the computer is being harnessed to this 'paper economy', not to do the same transactions more economically but to balloon the quantity and variety of financial exchanges... I fear that, as Keynes saw even in his day, the advantages of the liquidity and negotiability of financial instruments come at the cost of facilitating nth-degree speculation which is short-sighted and inefficient.

If this is your picture of the world, then you want to constrain finance. You may well want a core of regulated banks that cannot blithely create credit, take on leverage and secrete assets off their balance sheets, as today's banks have done. Although you would allow hedge funds and private equity to experiment, you would seek to contain their mischief by containing their access to capital. The era of Baroque exuberance would be over.

There is, however, another view: a presumption in favour of liberalised markets and innovation. On a grand historical scale, this is hard to argue with. Richard Sylla, a professor of economic history at NYU Stern School of Business in Manhattan, observes how often financial sophistication has gone with military and economic power. Think of 15th-century Italy and its banks; the 17th-century Low Countries; 18th-century British government debt and insurance; 19th- and 20th-century American capital. It is no accident, Mr Sylla says, that when Japan set out to industrialise in the late 1860s, almost the first thing it did was to copy the most advanced Western forms of financial management.

A few economists have set out to put a value on freer finance in the modern world. In a paper published at the end of 2006, Romain Ranciere, of the IMF, Aaron Tornell, of the University of California, Los

Angeles, and Frank Westermann, of the University of Osnabrück, concluded that financial liberalisation raises growth by around 1% per person per year. Other studies suggest that financial innovators gain from their discoveries, and that an actively traded stockmarket tends to be a signal of present and future growth.

Valuing freer finance

That is fine as far as it goes, but according to Josh Lerner, an expert in innovation at Harvard Business School, such studies are surprisingly rare compared with studies of technological innovation. Moreover, any academic paper setting out to record the effects of recent financial innovation would have missed the biggest data point of the past 80 years—the present crash. And even if it had not, there are so many factors to consider that the pro-liberalisation case may be hard to prove.

In the end the argument for embracing innovation is conceptual rather than empirical. As a rule, innovation is a source of wealth. It would be odd if financial services were an exception. Arguments in other fields that there is nothing left to discover have usually proved false. You can imagine how computer technology might lead to further financial innovation, even if it also sometimes creates instability. In addition, Mr Lerner believes that financial services need to be adapted to the economy of which they form part, and the economy is always changing. Foreign-exchange derivatives came into their own, for example, when exchange rates floated after 1971.

And even if you admire stripped-down finance, regulators cannot hold the line for

ever. Ultimately, they are likely to lose ground to financiers who will use arbitrage to work their way around the best-laid defences. Hard as it is to acknowledge at the moment, in the teeth of a recession, the judgment of Clément Juglar, a 19th-century French business-cycle theorist, has the ring of truth: "The richness of nations can be measured by the violence of the crises which they experience..."

Looking back from the pit of recession, it is difficult to recall how the investment banks' pre-eminence and the hedge-funds' wealth could ever have seemed to be the natural order. A time will come when today's fear is equally hard to fathom. Greedy once again, people will wonder why they did not buy shares at that price, why they did not realise corporate bonds were a steal and why they did not foresee a bout of inflation or a weak dollar.

Such shifts in perception are the result not of madness or criminality, but of individually rational responses to what Keynes saw as the inherent uncertainty in financial markets. Finance feeds on trust and mistrust, and amplifies whichever is ascendant. That is what makes financial markets dangerous.

Just now that probably seems like a reason to tie finance down. And indeed it could be better regulated, as the crisis has shown. But a thoroughgoing effort to tame finance would be futile and could come at a high cost. Frederic Mishkin, a former Fed governor, once called finance "the brain of the economy". The image conjures up power and importance, but it also evokes complexity and fragility. Finance is a remarkable creation. Do not suppress it, but use it wisely. ■

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